



Department of Energy

Richland Field Office
P.O. Box 550
Richland, Washington 99352

93-RPB-109

FEB 17 1993

9302102

Mr. David B. Jansen, P.E.
Hanford Project Manager
State of Washington
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Dear Mr. Jansen:

TRANSMITTAL OF THE GROUT TREATMENT FACILITY LEAK DETECTION CABLE DATA
TRANSMITTAL/REVIEW PACKAGE

Transmitted herewith is the data transmittal/review package for the new leak detection cable to be used at the Grout Vaults. This data was requested by Mr. J. J. Witczak of your staff at the October 26, 1992, Grout Unit Managers' Meeting.

Should you have any questions regarding this transmittal, please contact me or Mr. C. E. Clark of my staff on (509) 376-9333.

Sincerely,

James D. Bauer
James D. Bauer, Program Manager
Office of Environmental Assurance,
Permits, and Policy

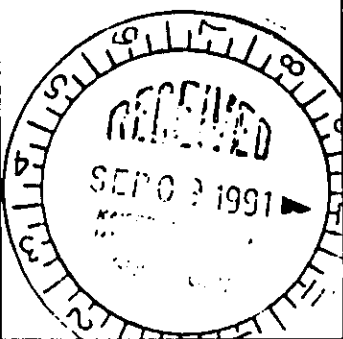
EAP:CEC

Enclosure:
Data Transmittal/Review

cc w/encl:
J. J. Witczak, Ecology
M. N. Jaraysi, Ecology
D. L. Duncan, EPA
R. E. Cordts, Ecology

cc w/o encl:
R. C. Bowman, WHC
G. W. Jackson, WHC,
T. M. Michelena, Ecology
P. T. Day, EPA



KAISER ENGINEERS HANFORD		DATA TRANSMITTAL/REVIEW				Submittal No. <u>129.1</u>																																																																																																																															
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Note: Re: Letter from Unit Processing to Power City on 08/08/91. Heat shrink tubing is for use with metal connectors on end of connectorized cable as shown on attachment 7 of this submittal. Reference ECN B-714-86 p.3, C) 2.1.4.4 and G) 3.2.8.4.																																																																																																																																					
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Unit Process Company

exclusive manufacturer's representatives

August 8, 1991

Power City Electric
P.O. Box 2663
Pasco, WA 99302

Attention: Mr. Don Andres
SUBJECT: KEH-5162, HANFORD GROUT FACILITY,
SUBMITTALS FOR CHANGE ORDER #104,
TRACETEK LEAK DETECTION CABLE

Dear Don,

Please accept this letter and its enclosures as Submittals for materials to be provided per the referenced Change Order. This change is a substitution of the customized "Low Profile" TraceTek 3000 leak sensing cable for the standard connectorized cable. The purpose is to preclude any difficulty pulling the cable into the annulus of the piping system due to tight clearance in the piping spacers and supports.

Specification submittals for the Sensing Cable (Spec 2.1.4) are met by Attachments 1, 2, and 3. Attachment 1 is the catalog product data sheet on the TT3000. It depicts a modular sensor cable with metal connectors since this is the standard offering. There is no published data sheets specifically for the "LP" cable, however, the only difference is in the cable ends. Attachment 2 is a reference letter from Raychem describing the "LP" configuration which may be useful for the record. Attachment 3 is a copy of the standard catalog numbers with the "LP" version written in. It also shows the Jumper Cable and End Termination.

Unit Process Company

exclusive manufacturer's representatives

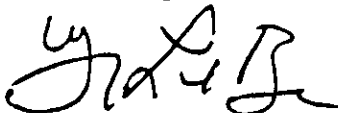
Attachments 4 and 5 are installation instructions for two methods of splicing end connections of the "LP" cable to the jumper wire half. This needs to be discussed with Kaiser. The TT-JSK-SL Scotchlok splice specified in Change #104 was not designed for use with a shrink tube. The silicone seal inside the plastic connector creates a water-tight barrier. The TT-JSK-HS18 is a crimp splice kit that does use a shrink tube. Either would be acceptable for the project, but the shrink tube and the Scotchloks are not typically used together.

Attachment 6 is a Sensing Cable Map that was done for a project at Boeing. Something similar would be submitted for the Grout Project, however, it will most likely be larger and have more detail due to the complexity of the Grout piping layout. The map for this project will be developed after the cable has been installed and tested, and submitted for approval prior to completion.

Attachment 7 is a more complete sensing cable instruction guide, being submitted here as the only Portable Test Box data available. It shows how the Portable Test Box is used during installation and testing of the cable.

Please call if there are questions on the enclosed material. I can be reached at (800) 833-8726. We appreciate your interest in and efforts toward the successful installation of the TraceTek system.

Best Regards,



Greg LeBrun

Sales Representative

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TraceTek®**TT3000
Sensing Cable**
Product Data

TraceTek® 3000 sensing cable detects the presence of conductive liquids at any point along their length. Most acids and bases and even de-ionized water can be sensed and located. Installed with a TraceTek alarm module, the cable senses the presence of fluid, triggers an alarm, and pinpoints the location of the first leak detected.

Continuous monitoring

TraceTek 3000 sensing cable provides distributed leak detection and location over a wide range of areas. Cable is available in a variety of lengths, providing as much coverage as necessary.

Design information

TraceTek 3000 longline sensing cable is available with preinstalled metal connectors that plug together. The measurement circuit is not dependent on the conductivity of the leaking fluid. Therefore, the same cable will detect a range of individual fluids or multiple fluids without special design consideration or calibration.

The cable is designed for a variety of applications including floor surfaces, subfloors, equipment locations, pipes, storage tanks, and trenches. The cable is small, lightweight, and flexible, allowing for easy installation. The smooth design allows for quick drying.

Technologically advanced

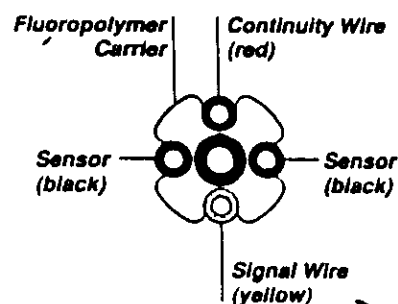
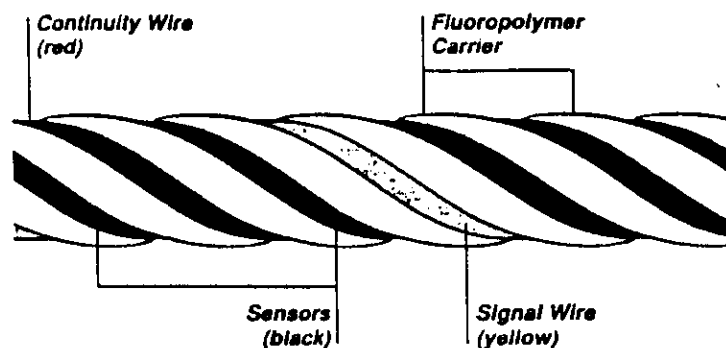
Raychem's conductive-polymer technologies make TraceTek 3000 sensing cable mechanically strong and chemically resistant. The cable is constructed of two sensor wires, an alarm signal wire, and a continuity wire embedded in a fluoropolymer carrier rod. This rugged construction, which exposes no metal, enables the reusable cable to withstand chemical attack in a broad range of corrosive environments.



9 5 1 2 5 6 5



Product characteristics



Drawing not to scale

Cable diameter:	.240 inches nominal
Cable diameter with connector:	.510 inches nominal
Continuity and signal wires:	2 x 26 AWG with insulation of fluoropolymer
Sensor wires:	30 AWG with jacket of conductive fluoropolymer
Carrier:	Fluoropolymer
Cable weight (50 ft length):	2 lbs

Technical information

Breaking strength:	160 pounds ASTM D-638
Cut-through force:	>50 pounds 0.005 inch blade Crosshead speed 0.2 inches/minute
Maximum operating temperature	90°C (194°F)
Cable connectors/splices	
Leak Detection System UL File No.	S3260/FM File No. OP7A4.AX/CSA File No. LR61900-2. For use in Hazardous Locations CLASS 1, GROUPS ABCD, DIV. 2. With Intrinsically Safe Output Circuits for CLASS 1, GROUPS ABCD, DIV. 1.

Chemical resistance

Exposure in accordance with ASTM D-543 @ 25°C (77°F) for seven days. Passing results based on functional values after testing.	trichloroethylene 100%
	sulphuric acid 98%
	hydrochloric acid 37%
	hexane 100%
	methanol 100%
	sodium hydroxide 10%
	xylene 100%
	aqua regia

Note: Prolonged exposure to concentrated ketones may cause temporary reduction in sensitivity—consult factory.

Ordering information

TT3000-xM/xFT-MC	TraceTek 3000 sensing cable
	Cable length -1.5M/5FT -3M/10FT -7.5M/25FT -15M/50FT -30M/100FT

Call us

Raychem Corporation
TraceTek® Products Group
300 Constitution Drive
Menlo Park, CA 94025-1164
415/361-4602
FAX 415/361-3904

All of the above information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their application. Raychem makes no warranties as to the accuracy or completeness of the information, and disclaims any liability regarding its use. Raychem's only obligations are those in the standard terms and conditions of sale for this product, and in no case will Raychem be liable for any incidental, indirect, or consequential damages arising from the sale, resale, use, or misuse of the product.

9 1 0 0 4 7 5 6

Raychem

Raychem Corporation
10000 1st Avenue
Richland, WA 99352Telephone (509) 923-1000
Toll Free (800) 451-7000
Telex 740000

March 5, 1991

Rod Snowwhite
Kaiser Engineering Hanford
1200 Jadwin
Richland, WA 99352

Subj: Field splicing alternatives for TraceTek Cable

Dear Rod:

Per our conversation yesterday, I would like to reiterate an alternative method of joining individual sections of TraceTek 3000 sensor cable. If you have determined that there is insufficient clearance in the pipe support fittings, then the "low profile" approach may be appropriate.

TT3000-MSC-xx-LP cable assemblies are furnished with 18 inches of four conductor leader wire spliced onto each end of the sensor cable. The "xx" in the part number designates the length of the sensor cable in feet. For instance a TT3000-MSC-50-LP would have 50 feet of TT3000 sensor cable with 18 inches of four conductor leader wire splice onto each end. The TT3000 "LP" cables are available in the standard lengths of 50, 25, 10 and 5 feet. The cable assemblies can also be ordered in custom cut lengths.

There are two methods of splicing one cable section to the next. Method 1, which we discussed yesterday, utilizes 3M Scotchlocks. In the field the installer simply inserts matching colors into the Scotchlock device and snaps the fitting shut with a pliers type device. There are four conductors to be spliced at each cable junction, so four Scotchlocks are used. Raychem packages the Scotchlock devices in bags of twenty under the part number: TT-JSK-SL

Method 2 for field splicing provides more flexibility during system commissioning and later test and maintenance. Instead of directly splicing one sensor cable to the next, a short connectorized jumper cable is spliced onto the ends of the sensor cables to be joined. The Scotchlock fitting are again used to do the actual conductor to conductor splicing. This alternative method results with standard connector fitting between the cable sections and can provide access for field measurements with the hand held PTB instrument. Each connector spliced into the system in this manner requires a total of 8 Scotchlocks and the addition of the short

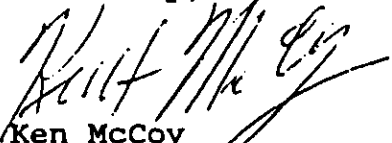
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connectorized jumper cable TT-MJC-3-MC.

Greg Lebrun of Unit Process Company proposed the methods discussed above as Option 2 of his letter to Don Andres of Power City Electric on February 28, 1991.

If I can be of further assistance please feel free to call me at 415-361-6485.

Sincerely,



Ken McCoy
National Sales Manager
TraceTek/EPS
Raychem Corporation

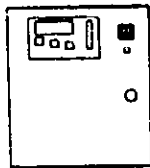
cc: Adrienne Klopach, Raychem
Greg Lebrun, Unit Process Company

9 0 1 1 2 4 1 3 6 8

TraceTek 3000 Longline System

Catalog Number

Alarm and locator module



Metal enclosure

TTB-xx

Display

F-1-1,500 feet

M-1-500 meters

Supply voltage

A-120/240 VAC

D-24 VDC

Optional accessories

4-20 mA current transmitter

Separate continuity relay

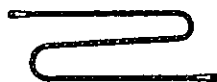
Semiflush mounting flange

TTB-CTR

TTB-REL

TTB-FLG

TraceTek 3000 sensing cable



Modular sensing cable with metal connectors

TT3000-xM/xFT-MC

Cable length

1.5M/5 FT

3M/10 FT

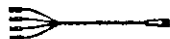
7.5M/25 FT

15M/50 FT

30M/100 FT

For "Low Profile" cable
TT3000-MSC-XX-LP
Specify length, ft →

Leader cable

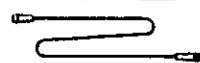


Modular leader cable, 12 feet

(3.5 meters) with metal connectors

TT-MLC-MC

Jumper cable



Modular cable with metal connectors

Cable length

25- 25 feet (7.5 meters)

50- 50 feet (15 meters)

100-100 feet (30 meters)

TT-MJC-x-MC

3

End termination



Metal connector version, terminates sensing cable and cable branches

TT-MET-MC

Weighted length



Metal connector version, simulates

15-foot (5-meter) length of sensing cable at the point installed

TT-WL-15-MC

Branching connector



Metal connector version, connects a sensing cable branch to the sensing circuit

TT-MBC-MC

Caution tags



50 sensing cable identification markers

TT-TAG

Hold-down clips



50 clips that attach sensing cable to flat surfaces

TT-HDC-1/4

Other Accessories

Portable Test Box
Cable Pulling Tool
Pull Rope

TT-PTB-1000

TT-CPT

TT-PR



Listed



Raychem Corporation
TraceTek® Products Group
300 Constitution Drive
Menlo Park, CA 94025-1164
415) 361 4602
FAX 415) 361 3904

All information presented here, including illustrations, is believed to be reliable and in accordance with accepted engineering practice. However, Raychem makes no warranties as to the completeness of the information. Users should evaluate the suitability of each product for their own particular application. Raychem's only obligations are those set forth in the Standard Terms and Conditions of Sale for this product. In no case will Raychem be liable for any incidental, indirect, or consequential damages arising from the sale, resale, or misuse of the product.



TT-JSK-SL Splice Kit Installation Instructions

A. General Information

TT-JSK-SL Splice Kit

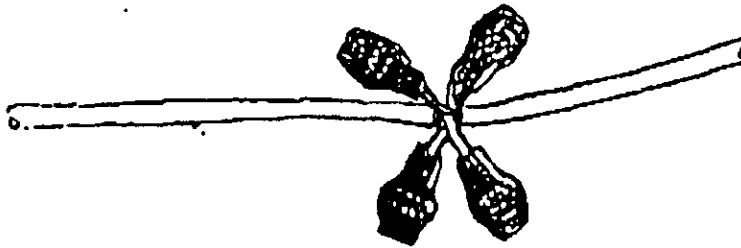
The TT-JSK-SL splice kit is used to connect separate lengths of TraceTek 18 AWG jumper cable together. Kit contents include materials for five complete splice connections. This kit is recommended for connections which are exposed to the environment, rather than protected by a junction box. The TT-JSK-HS18 splice kit is recommended for use in a junction box.

Parts and Materials

20 ea 3M Scotchlok button connectors
(4 per splice)

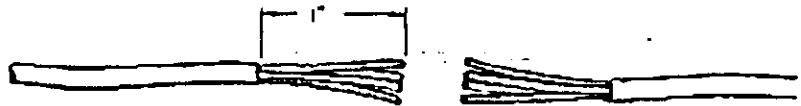
Installation Tools

3M 3-9B Scotchlok crimp tool
Flush cutters
Wire strippers (18 AWG)



931291470

1. Strip the outer jacket back 1" on the cables to be joined. Do not nick jumper wire insulation. If nicked, cut off and begin again. Do not strip insulation from wires.



2. Match color coded wires as follows:

black	black
red	red
yellow	yellow
green	green

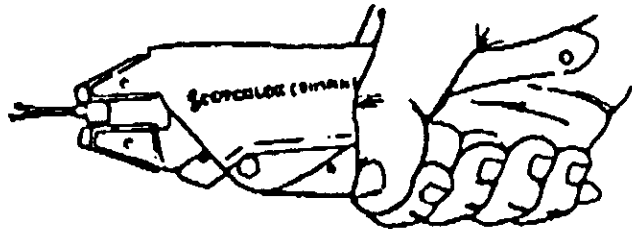


3. Fully separate the two wires, trim, and straighten.

4. Push color coded wires all the way into the connector port. With button side down, visually check to ensure that each wire is into its port.



5. Using the 3M E-9B crimp tool and with button side down, crimp by fully pressing together. Button must be flush with body.



6. Repeat Steps 3 through 5 for the three remaining sets of wires.

Raychem

TraceTek

TT-JSK-HS18 Splice Kit Installation Instructions

A. General Information

TT-JSK-HS18 Splice Kit

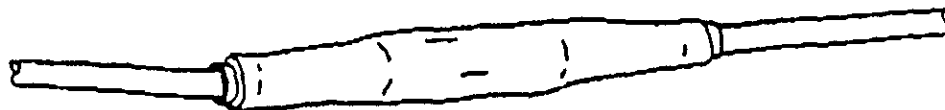
The TT-JSK-HS18 splice kit is used to connect lengths of TraceTek 18 AWG jumper cable to jumper cable. Kit contents include materials for five complete splice connections. This kit is recommended for connections which are exposed to the environment, rather than protected by a junction box.

Parts and Materials

20 ea	Red barrel crimps (4 per splice)
10 ea	HMSS hot-melt split tubes
5 ea	HIFX heat-shrinkable tubes

Installation Tools

Raychem AD-1522 crimp tool or equivalent
 Raychem CV-5300 heat gun with wide deflector or equivalent
 Flush cutters
 Wire strippers (18 AWG)



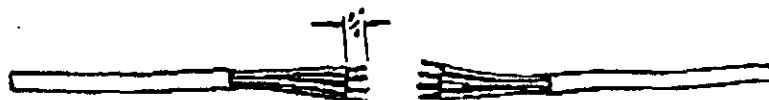
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B. Procedure

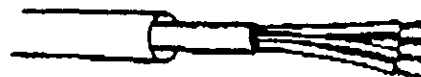
1. Strip the outer jacket 1-1/2" back on the cables to be joined. Do not nick jumper wire insulation. If nicked, cut off and begin again.



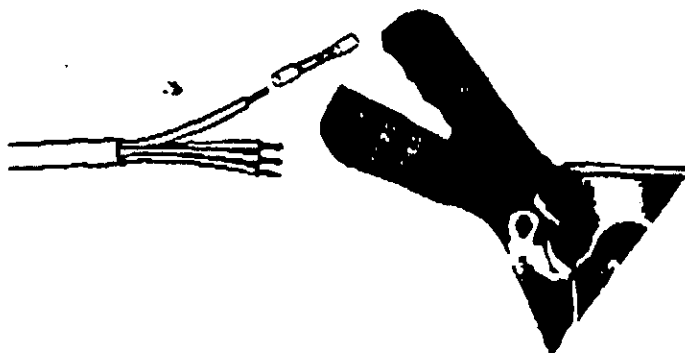
2. Strip the insulated jacket 3/8" from each end of exposed wires.



3. Slide the HIEX tube over one end of the cables and move down out of the way.



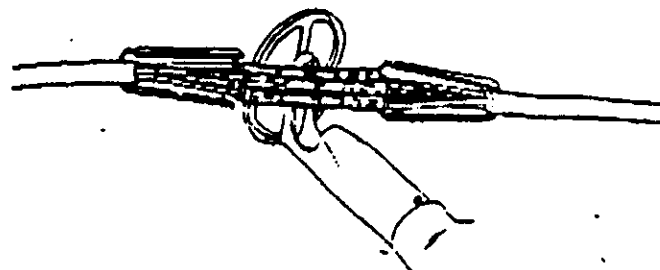
4. Using the Raychem AD-1522 crimp tool and one red crimp barrel, crimp the exposed wire on one end of the prepared cable end. Then crimp the matching colored wire on the other cable to the other end of crimp.



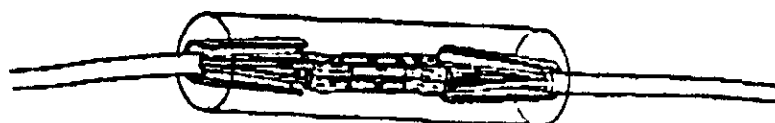
5. Repeat Step 4 for remaining three wires matching color coded wires as follows:

black	black
red	red
yellow	yellow
green	green

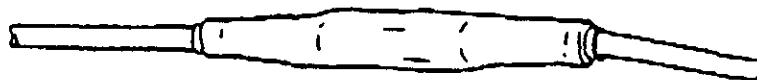
6. Using the Raychem CV-5300 heat gun, heat the red shrink tubing of the crimp barrels down over each of the four wire connections. Ensure that the ends of each crimp barrel are shrunk over the wire at each end.



7. Place one HMSS split sleeve on either side of the crimp connections as shown. The adhesive sleeve should cover the insulated wires and extend over the end of the insulated cable.



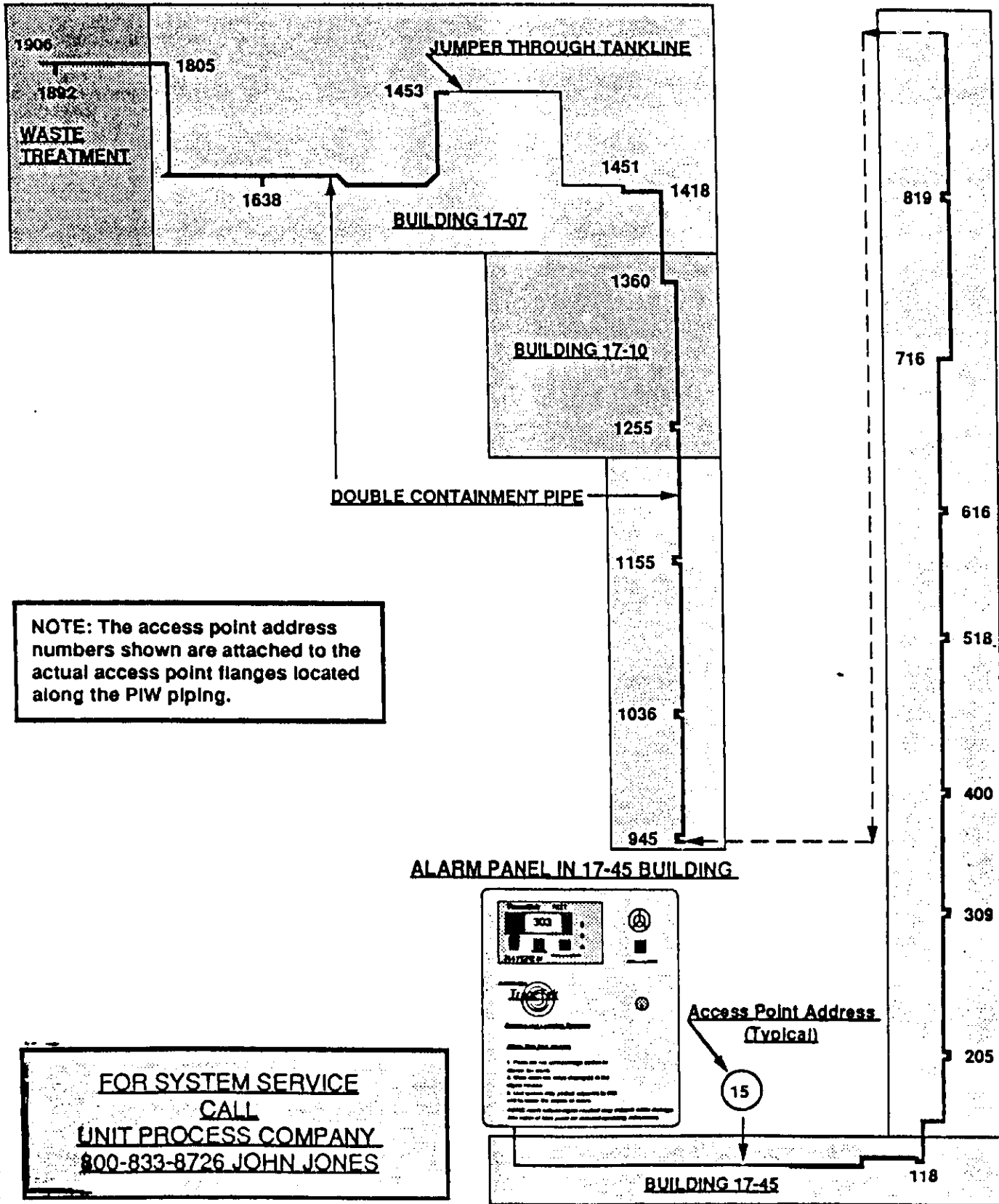
8. Center the HIEX tubing over the connection and use the heat gun to shrink the HIEX tube and melt the HMSS adhesive to encapsulate the crimp connection.



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TWX 910 373 1728

TRACETEK LEAK DETECTION SYSTEM

PIW CONTAINMENT PIPELINE FROM BUILDINGS 17-45 TO 17-07





TT300 Sensing Cable Installation Instructions

A. General Information

TT300 Longline System

The TT300 sensing cable together with the alarm and locator module detect and pinpoint aqueous chemical leaks at any location along the cable length. The modular sensing cable and system components are supplied with pre-installed connectors that plug together.

Electrical Codes

Installation must be done in accordance with NEC and other regulations that apply.

Installation Tools

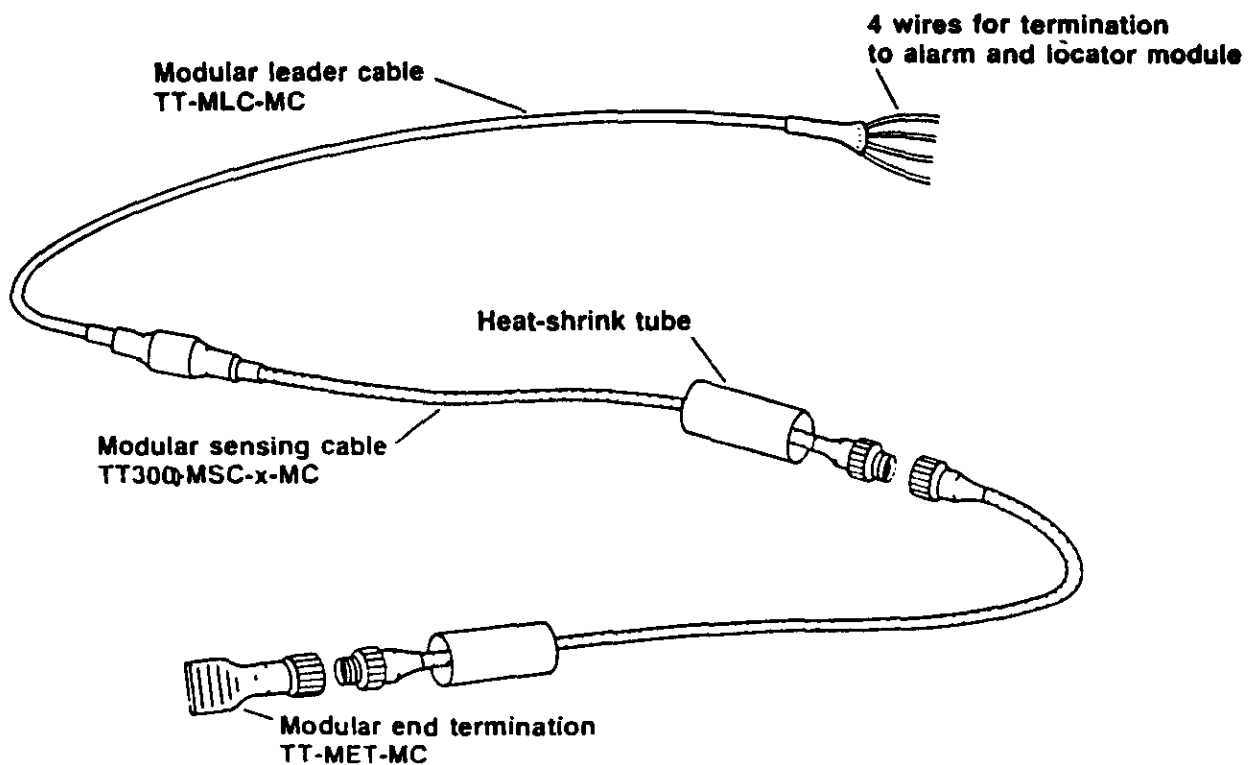
TraceTek Portable Test Box (TT-PTB)
or
High impedance ohm-meter (minimum 20 megohms) Fluke 8060A or equivalent
Raychem CV-5300 heat gun or equivalent

Parts and Materials

1 ea	Modular leader cable (TT-MLC-MC)
as needed	Modular sensing cable (TT300-MSC-x-MC)
as needed	Modular jumper cable (TT-MJC-x-MC): special connectorized 4-wire interconnection cable
as needed	Modular end termination (TT-MET-MC)
as needed	Hold-down clips (TT-HDC-1/4): includes plastic adhesive 3M type 4475
as needed	Caution tags (TT-TAG)
as needed	Weighted length (TT-WL-15-MC)
as needed	Branching connector (TT-MBC-MC)
	Heat-shrink tubes included with above components when required

Note: Do not use damaged or contaminated sensing cable.

Typical system



B. Before Installing the Sensing Cable

1. Design the layout of the system on a floor plan.
2. Install TraceTek sensing cable only after all construction work (including mechanical, plumbing, electrical and painting) is completed. The installation area must be clean, dry and free from oil, and any conductive materials such as solder flux, coffee, etc.
3. Check parts and materials for completeness.
4. Install hold-down clips (TT-HDC-1/4) at approximately 8-foot intervals where the sensing cable will be run, and secure with plastic adhesive. Let the adhesive dry as per manufacturer's recommendation.
5. Mount the TraceTek alarm and locator module and test according to the module installation instructions.
6. Check that each length of sensing cable is clean and intact according to Section F.

C. Installing the Sensing Cable

1. Connect the end termination to the first sensing cable length to be installed.
2. Working from the alarm and locator module, lay out the sensing cable by putting the reel on an axle and pulling the end with the termination alongside the installed hold-down clips (minimum bending radius is 1/4"). Leave 6" of sensing cable on each end for the connector service loop.
3. Verify that the plastic adhesive securing the hold-down clips has dried - liquid adhesive must not contact the cable. Push sensing cable into the hold-down clips and position the sensing cable to lay flat on the surface to be monitored.



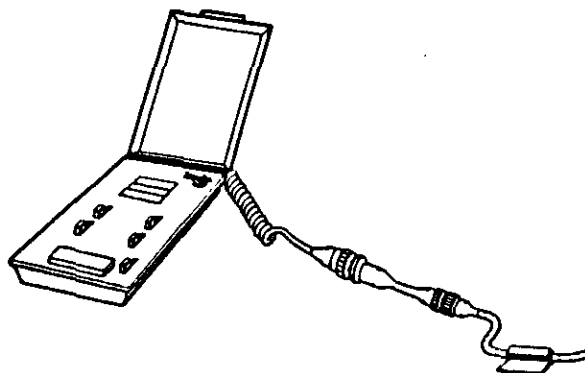
Note: For installations on pipe, trace the sensing cable along the underside of the pipe and fasten with nylon tie wraps. Spiral wrap an open-cell polyurethane foam strip using a 10% overlap over the pipe and sensing cable to secure the wetted length of sensing cable required for a leak alarm.

C. Installing the Sensing Cable (cont'd.)

4. (Ignore this step for the first sensing cable length only.) Push heat-shrink tube onto sensing cable and connect the sensing cable to the cable already installed. Leave a service loop at each connector as shown. Mark the connector position onto the layout plan.

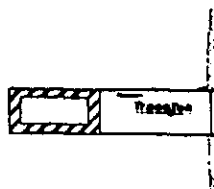


5. As each additional length of sensing cable is installed, check that the entire sensing cable is clean and intact according to the instructions in Section F. Switch off the portable test box (PTB) or ohm-meter, but leave connected until the installation is completed.



6. (Ignore this step for the last sensing cable length only.) Unplug the end termination from the previous length of cable and connect it to the next length of sensing cable to be installed. Repeat Steps 2 through 6 of this section.

8. Install heat-shrink tubes over all mated male/female connections as follows:



a) Move the heat-shrink tube along the sensing cable until it is centered over the male/female connection.

b) Using a Raychem CV-5300 heat gun, shrink the tube over the connection beginning at one end and shrinking towards the other end until tube fully conforms to the shape of the connection.

Optional accessories:

- Caution tags (TT-TAG): identification markers on sensing cable at approximately 25-foot intervals.
- Weighted length (TT-WL-15-MC) and branching connector (TT-MBC-MC): follow the instructions provided with the equipment.
- Modular jumper cable (TT-MJC-x-MC): connects sensing cable between different locations.

D. Connecting the Alarm Module and Testing

Connect the leader cable to the alarm and locator module and test the complete system according to the module installation instructions.

E. Incomplete Cable Installation

1. At the end of the work day:

- Terminate the last section of installed sensing cable using the end termination.
- Connect the installed sensing cable to the alarm and locator module.
- Test the system and leave operating as per the module installation instructions.

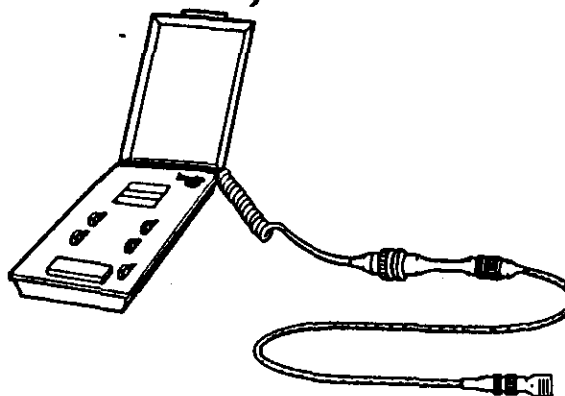
2. At the beginning of the next work day:

- Check that the installed sensing cable is clean and intact according to the instructions in Section F.

F. Checking the Sensing Cable

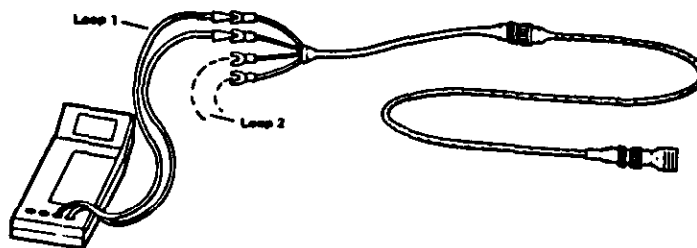
TraceTek Portable Test Box (TT-PTB) Method:

1. Ensure that the end termination is connected to the sensing cable.
2. Connect the PTB to the sensing cable as illustrated.
3. Check that the sensing cable is clean and intact by following the PTB operating instructions provided with the equipment.
4. If sensing cable is not clean and intact, find the length of cable affected and replace.

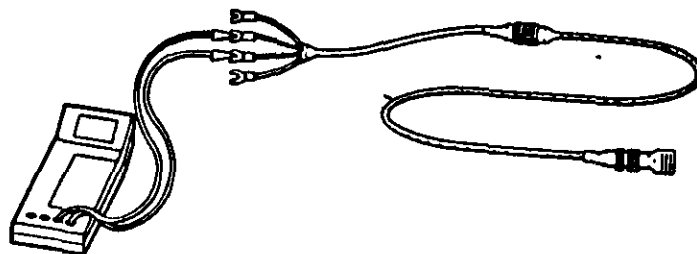


Ohm-meter Method:

1. Ensure that the end termination is connected to the sensing cable.
2. Connect the leader cable to the sensing cable.
3. Check that the sensing cable is intact:
 - Loop 1: Measure the resistance between the yellow and black wires of the leader cable.
 - Loop 2: Measure the resistance between the red and green wires of the leader cable.



The reading should be approximately 4 times the number of feet of cable length connected (e.g. 50 feet installed $\times 4 = 200$ ohms), or 12 times the number of meters of cable length connected (e.g. 15 meters $\times 12 = 180$ ohms). The resistance of the two loops should be within 5% of each other.



For readings exceeding the 5% difference or exceeding 10 megohms, find the length of sensing cable affected and replace.

4. Check that the sensing cable is clean.
 - Measure the resistance between the black and green wires of the leader cable.

For readings below 20 megohms, find the length of sensing cable affected and replace.

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